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ABSTRACT

This digest discusses two specific computer-aided instruction systems used in two-year colleges in the United States and Canada, and addresses critical points regarding system implementation in remedial education programs. As developed in the Nova Scotia Community College System in Canada, the INVEST computer system provides literacy-based instruction, adult basic education, and General Education Development (GED) Exam preparation. Pre-tests and post-tests determine the students' level of study. The INVEST system resulted in students having a greater increase in their mathematics achievement than those who underwent traditional teaching, but the increase in reading skills was not significant between the two groups. Project SYNERGY, instituted at Miami-Dade Community College (Florida), integrates a Windows-driven access module for the student with a command module for the instructor. This allows for a variety of activities that facilitate student-teacher interaction. General observations on computer-assisted remedial instruction are that the role of the instructor easily may be changed to that of the facilitator, and that collaborative learning is critical. The digest also describes certain student, faculty, and institutional traits that facilitate the success of computer-assisted remedial programs. (YKH)

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Office of Educational Research and Improvement

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Using Technology in Remedial Education

by Jennifer Rinella Keup

"Remedial education," "academic upgrading," and "basic skills instruction," are among the many terms used to describe higher education programs for students who are not academically prepared for college-level work. Regardless of the semantics, remediation is a continuing challenge for higher education institutions. This is especially true for community colleges where the majority of students requiring remedial curricula is concentrated. In an effort to increase financial efficiency and learning effectiveness, community colleges have investigated the use of technology and computer-aided instruction in remedial education (Wilson, 1992; McMillan, Parke & Lanning, 1997). Over the past few decades, a burgeoning technology industry has struggled for a place in the traditional education system. The real question regarding technology use in higher education curriculum is not "whether to use computers in education, but how" (Rapp & Gittinger, 1993, p. 2). Many potential benefits of computer-aided instruction have been suggested including privacy, objectivity, timeliness of feedback, individuation of learning, flexibility, convenience, and a non-threatening learning environment for students (Wilson, 1992). These features of computer-aided instruction appear to offer an arena for the integration of educational goals with technological advancements in remedial education.

This Digest discusses two specific computer-aided instruction systems used in remedial education programs at two-year colleges in the United States and Canada: SYNERGY and INVEST. Additionally, general observations regarding the student outcomes from the use of these computer-based systems will be addressed including some critical points regarding the implementation and adjustment process for institutions utilizing technology and computers in remedial education programs.

The Instruction Systems

As implemented in the Nova Scotia Community College System in Canada, the INVEST system is a Local Area Network (LAN) computer system that incorporates approximately 4,000 lessons into a three-tiered system. Tier 1 provides Literacy-Based Instruction. Tier 2 focuses on Adult Basic Education, and Tier 3 furnishes General Education Development (GED) Exam Preparation. Mathematics, reading, writing, and life-skills instruction are available in each of the three tiers, and instructors determine the level of mastery required of students to progress within the tier.

A pre-test determines where students are placed initially within the lessons in each subject area. These computerized lessons provide information and opportunities for practice in the four subject areas. Performance on a post-test measures students' mastery of the subjects. A successful performance on the post-test allows the student to advance to the next module of pre-test and lessons in that tier. Instructors are made aware of student difficulties through a "lock out" mechanism on the program. That is, after the maximum number of unsuccessful attempts (as previously determined by the instructor) is reached on the mastery tests, the program will freeze and require the student to see the instructor in order to continue the program (Moore, 1993).

Another means instructors used to communicate with students in the Nova Scotia Community College INVEST project is a computerized journal. One file of the journal is private, and students are encouraged to write in it daily. The other file is an interactive teacher-student journal. Students are expected to write comments, concerns and questions on a daily basis, and the instructor reads and responds to the student communication. According to both Wilson (1992) and Moore (1993), student gains were achieved in both reading and math. The increase in reading was not significantly different from the gains found in reading among students in a traditional, non-computerized remedial program. However, the increase in mathematics achievement using the INVEST system, particularly in the areas of mathematical concepts and problem solving, was greater than the gains in classrooms using traditional teaching approaches (Wilson, 1992; Moore, 1993).

Project SYNERGY is an instructional management system that was developed through the efforts of 19 two-year colleges and three four-year colleges under the direction of Miami-Dade Community College in Miami, FL. The system and instructional software are the result of research conducted by 39 faculty members at four institutions. They reviewed over 298 software packages to assess quality, amass a bank of questions to test for basic skills mastery, and conduct software implementation tests (Anandam, 1994). The end product of the review is the Project SYNEGY integrator, an adaptive, computerized management system for remedial education (Anandam, 1994).

The Project SYNERGY Integrator (PSI) facilitates basic-skills development through a Windows-driven access module for the student and command module for the instructor. The integration of these two modules allows instructors to set preferences, monitor the students' progress, receive reports, modify the curriculum, send e-mail, and personally intervene in the learning process. Additionally through the system, the student is able to create a personalized curriculum based on computerized

placement tests. The student is also able to ask for assistance from other students or the instructor at any time during the learning process.

General Observations

In discussions of computer-aided instruction, an often-raised question is, "Is it better than text- or lecture-based instruction?" With regard to remedial education, the results have been quite positive. Initial findings about the effectiveness of computerized programs have largely been determined through the use of student evaluations and student and instructor feedback. Regardless of the source of the feedback, the type of computer-assisted instruction, or the location of the program, several observations were consistent.

The first of these observations is that "self-paced," "self-directed," and "self-sufficient" computerized technology used by students in remedial programs may change the role of the instructor to that of a facilitator, but the computer does not replace the instructor. The role of the instructor is critical in the management of the educational systems, especially in introducing students to computer use (sometimes for the first time), and monitoring and providing timely feedback on the student's progress. In one sample of feedback from students using the INVEST program at the Cumberland Campus of the Nova Scotia Community College System, 80 percent stated they wanted more time with the instructor to confirm what they were learning from the computerized lessons (Moore, 1993). However, one main complaint of instructors was that various systems of computer-aided remedial instruction require the instructor to function so much as a "system manager" that the role of the instructor as a "learning facilitator" may suffer (Wilson, 1992; Moore, 1993; Perry & Ford, 1994). Clearly this is an area for refinement in the future of computer-assisted remedial instruction.

A second general observation from many institutions using these types of programs is that collaborative learning is a critical component to computer-assisted remedial education. Student-to-student communication was either a built-in component to the computer system or was strongly encouraged in remedial-developmental programs. Student and instructor feedback indicated that this was easy to accomplish through e-mail and Local Area Networks and was an important part of the learning process.

Finally, researchers have identified certain student, faculty, and institutional features that facilitate the implementation and success of these computer-assisted remedial education systems. Perry and Ford (1994) cite mature, independent students, a sophisticated computer system, and a well-equipped computer lab. Cornell, Fazio, Florschuetz, Howard, Leyva, Martinez, Mee, O'Brien and Reinders (1996) found a relevant and holistic curriculum with clear learning objectives to be integral to success. Anandam (1994) lists such features as faculty involvement, an institutional commitment to technology, faculty development programs, and realistic expectations and assessment procedures.

Conclusion

The demand for remedial education at the post-secondary level continues to increase and provides new pressures for many community colleges. Based on positive student and instructor response to computer-aided instruction, it appears that technology can provide one answer to this growing challenge. Several common themes emerge when discussing the successful implementation of computer-aided remedial curriculum and should be considered in the planning and implementation stages of remedial education programs. Formal systems such as INVEST and SYNERGY are beginning to provide an infrastructure for community colleges to systematically handle the challenges and demands of remedial education through the use of technology.

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